Minutes -- WG4 telecon 7-24-01

Participants:

Greg Stayton (L3-Comm)
Steve Koczo (Rockwell Collins)
Lee Etnyre (UPS AT)
Michael Petri (FAA WJHTC)
Mike Ulrey (Boeing)
Bill Lee (Boeing)
Jerry Anderson (FAA Certification)
Ann Drumm (MIT LL)
Bob Stemm (Raytheon)

1. Conflict Detection State Diagram

Michael Petri presented his Conflict Detection (CD) state diagram that he developed from
the latest CD application description being developed by WG1. He described the alerting
concept, which uses low-level alerts, PAZ alerts, and CAZ alerts as increasing levels of
conflict severity. The individual CD states represent the various alert states that the
application can enter into. Each alerting state can transition into any other alerting state.
As alerts are cleared, ennunciations are withdrawn accordingly. Michael indicated that
one does not clear a CAZ ennunciation unless the PAZ alert is also cleared.

Michael also noted that multiple alerts may be active at the same time for a number of
aircraft, and that it is necessary to prioritize the alert presentation to the pilot to the more
severe alerting condition. Michael indicated that the full CD logic has not yet been fully
developed by WG1.

It was noted that "alert ennunciated" is not a state represents but an action.

Bob Stemm asked whether the pilot needs to inform ATC about the existence of an alert
to ensure that the flight deck and ATC are in synch (perhaps via broadcast of the alert
information via ADS-B)? Ann Drumm noted as an analogy, that for TCAS RAs, prior
studies and discussions with controllers identified that controllers do not want to be
informed of the RA information. Ann referenced some MIT LL and MITRE work in this
area and noted that the best reference would be the MITRE human factors study on this
topic. The need for controller information on alerts needs further discussion in WG1.

Concern was raised about various vendors developing their own proprietary alerting
algorithms, that potentially are not interoperable or consistent. The group agreed that this
is of concern. Greg Stayton noted that from an avionics vendors perspective that we
don't want to do our own alerting algorithms due to liability considerations. Jerry
Anderson noted that certification will likely require standard algorithms and that no
multiple vendor algorithms would be allowed.

In addition to the state diagram, Michael also described the pilot's states and the interactions with the CD alerting states. Mike Ulrey agreed that this was a good way to divide the representation of the pilot state view and the equipment state view. (This is similar to the equipment, flight crew, and ATC perspectives presented previously for the Approach Spacing application by Randy Bone). Mike Ulrey noted that it is important to capture these different perspectives in order to be able to reliably identify potential hazards.

2. State Diagram Overview

Steve Koczo provided an overview of the state diagram process and provided some informal definitions of states, events, transitions, actions, and activities. The goal is to settle on a generic approach to developing ASA application state diagrams. He noted the hierarchical approach in developing state diagrams, suggesting that using ~5-8 states to describe an application is appropriate, with further decomposition of states into lower-levels state diagrams as needed. Steve discussed the notion of life-cycle states (normal/null, set-up/eligible, armed, active, and disengage states) that are typical of most applications. Steve also noted the need for 'custom' states depending on the focus of the application (alerting, guidance, situational awareness, etc).

Steve raised the question of whether all three perspectives (equipment, flight crew, ATC) are needed, and whether they need to be represented in an integrated fashion. He suggested that generally the equipment perspective would be of greater focus for WG4 (to develop RSP), while the ATC and flight crew perspectives are of greater significance to WG1 for procedure evaluation, human factors evaluation of workload and the human machine interface.

Mike Ulrey reiterated that we need to capture all of these perspectives / views in order to achieve our ultimate goal of identifying all the hazards associated with an application. The need for integration of these views in a single state diagram depiction is less clear and may not be necessary. Mike restated Boeing's interest in using the Universal Modeling Language to capture these views for further analysis. Bill Lee also noted that each application will make things concise in its own way, i.e., there is no single, generic representation that will work across all applications and that many applications will have unique components / representations.

3. Enhanced Visual Approaches

Bill Lee presented another view of the Enhanced Visual Approaches (EVA) which offers an additional approach to identifying operational hazards. EVA was captured using a flow chart approach that identifies the normal operations. At each stage, potential errors / failure events (representing the exception paths) are identified that lead to operational hazards. Bill also identified various operational factors that may be present (e.g., other traffic in vicinity, traffic has similar flight ID to target of interest, etc) that can lead to hazards.

It was noted that identification of failures can easily proliferate into a geometric expansion of hazards, and that tools are better at identifying hazard cases then humans. Steve Koczo suggested that Bill discuss his approach / method further with the Safety Subgroup.

4.   Miscellaneous Items

Michael Petri inquired about the issue of vertical integrity (as compared to horizontal integrity limits, HILs). This item apparently came up in recent WG3 discussions. Mike Ulrey will check with Tony Warren on the significance of this issue and whether WG4 needs to address this issue.

Michael also noted WG1 CD&R subgroup is discussing the need for identifying whether traffic is TCAS equipped and whether TCAS is operational as additional data items to be transmitted. Is this a WG4 issue? This should be considered as an agenda item for the August joint WG1/WG4 meeting.

This concludes the telecon minutes.